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McCabe et al.

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(54) **HOLLOW GOLF CLUB**

(75) Inventors: **Terrill R. McCabe**, Carlsbad, CA (US); **Peter J. Gilbert**, Carlsbad, CA (US)

(73) Assignee: **Acushnet Company**, Fairhaven, MA (US)

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This patent is subject to a terminal disclaimer.

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(52) **U.S. Cl.** **473/335**; 473/334

(58) **Field of Search** 473/334–340, 473/341, 345, 326

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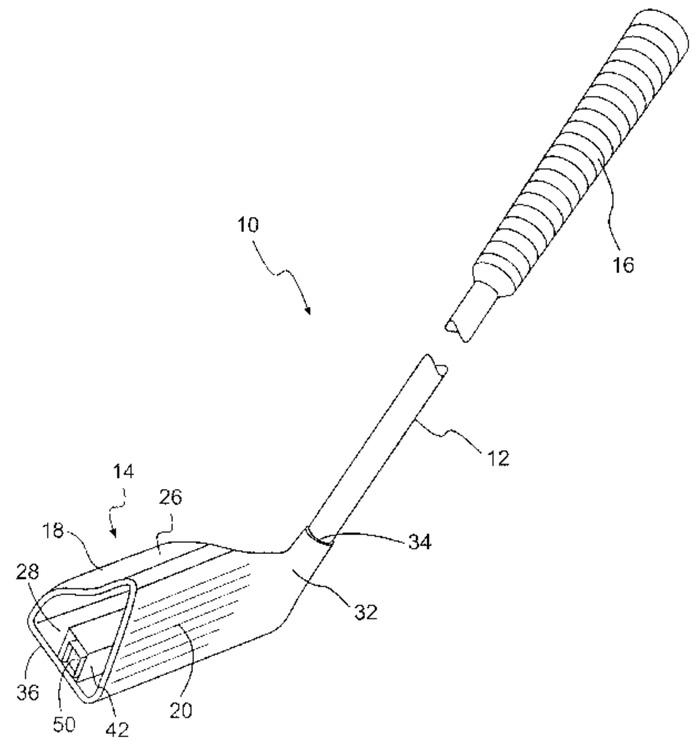
Primary Examiner—Paul T. Sewell
Assistant Examiner—Alvin A. Hunter
(74) *Attorney, Agent, or Firm*—Swidler Berlin Shereff Friedman LLP

(57) **ABSTRACT**

A golf club head, wherein the head comprises a front striking face, a back plate, a toe wall, a heel wall, and a sole plate, configured to form an interior cavity; a hosel and a bore for receiving a shaft; at least one chamber formed inside the interior cavity by a plurality of wall members and one of the front striking face, back plate, toe wall, heel wall, and sole plate; a weight member disposed within the chamber; and a filler material juxtaposed the weight member and the wall members forming the cavity such that the weight member is isolated from the wall members and is securely held within the chamber.

20 Claims, 8 Drawing Sheets



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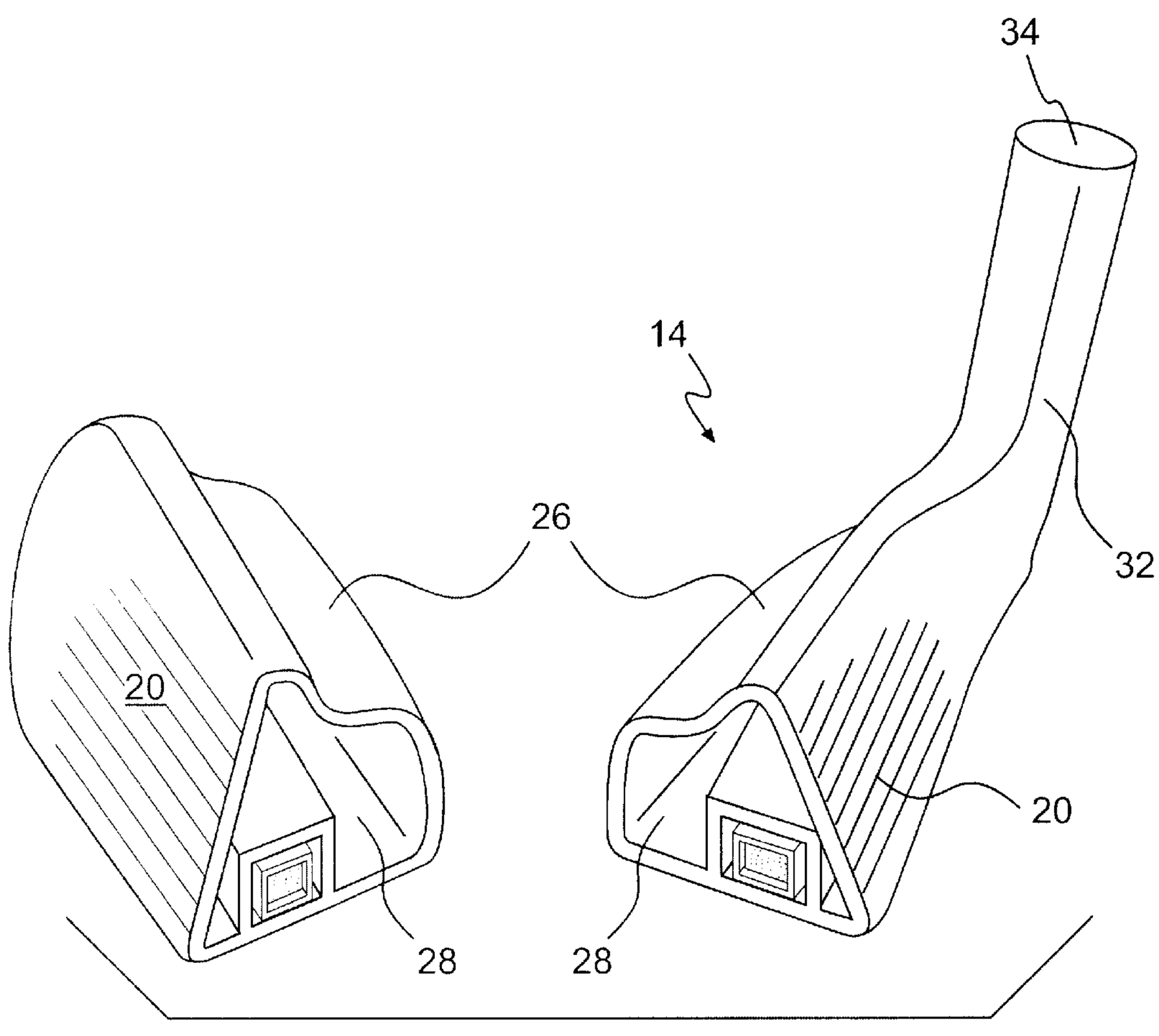

FIG. 1A

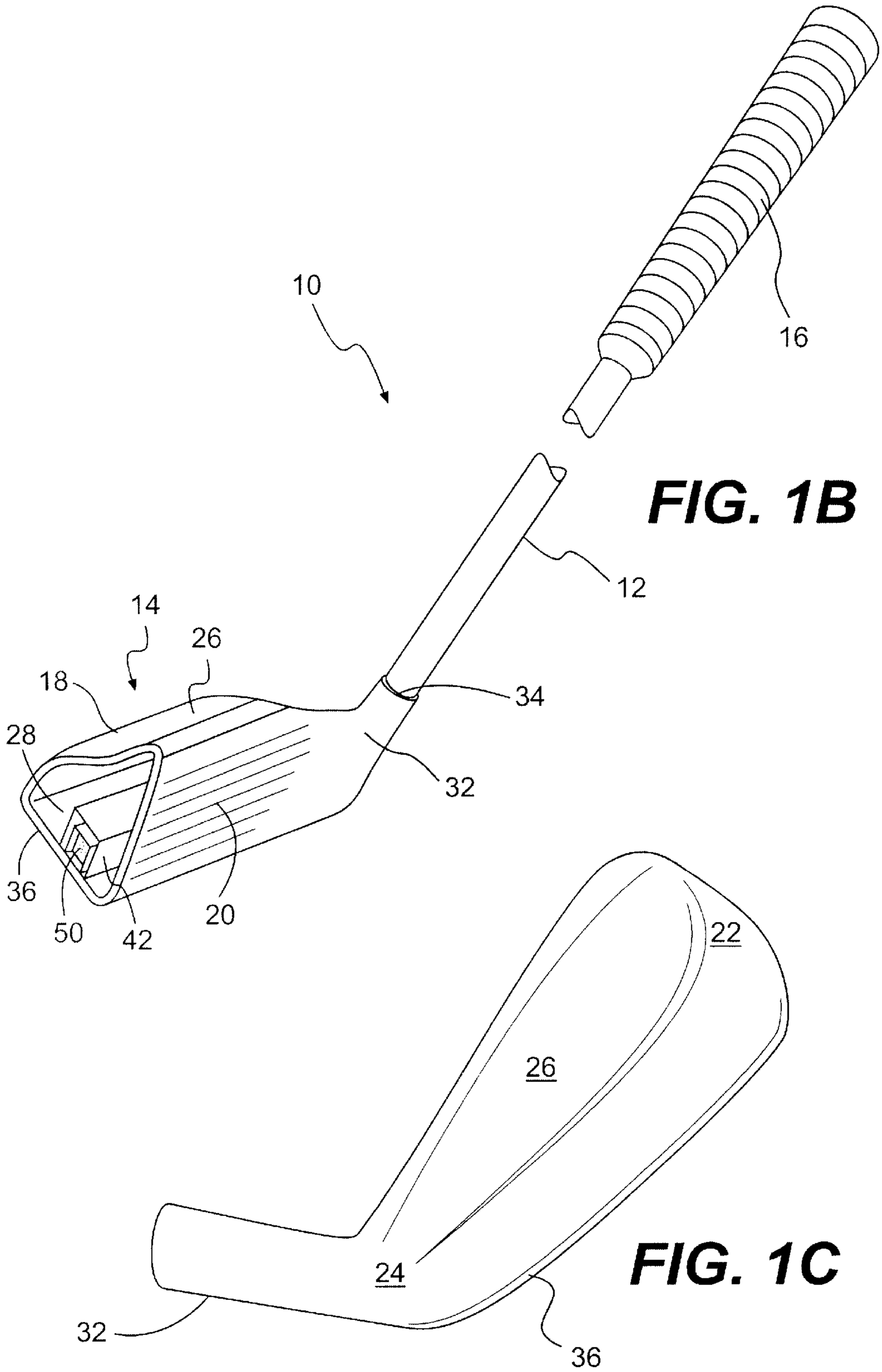

FIG. 1B

FIG. 1C

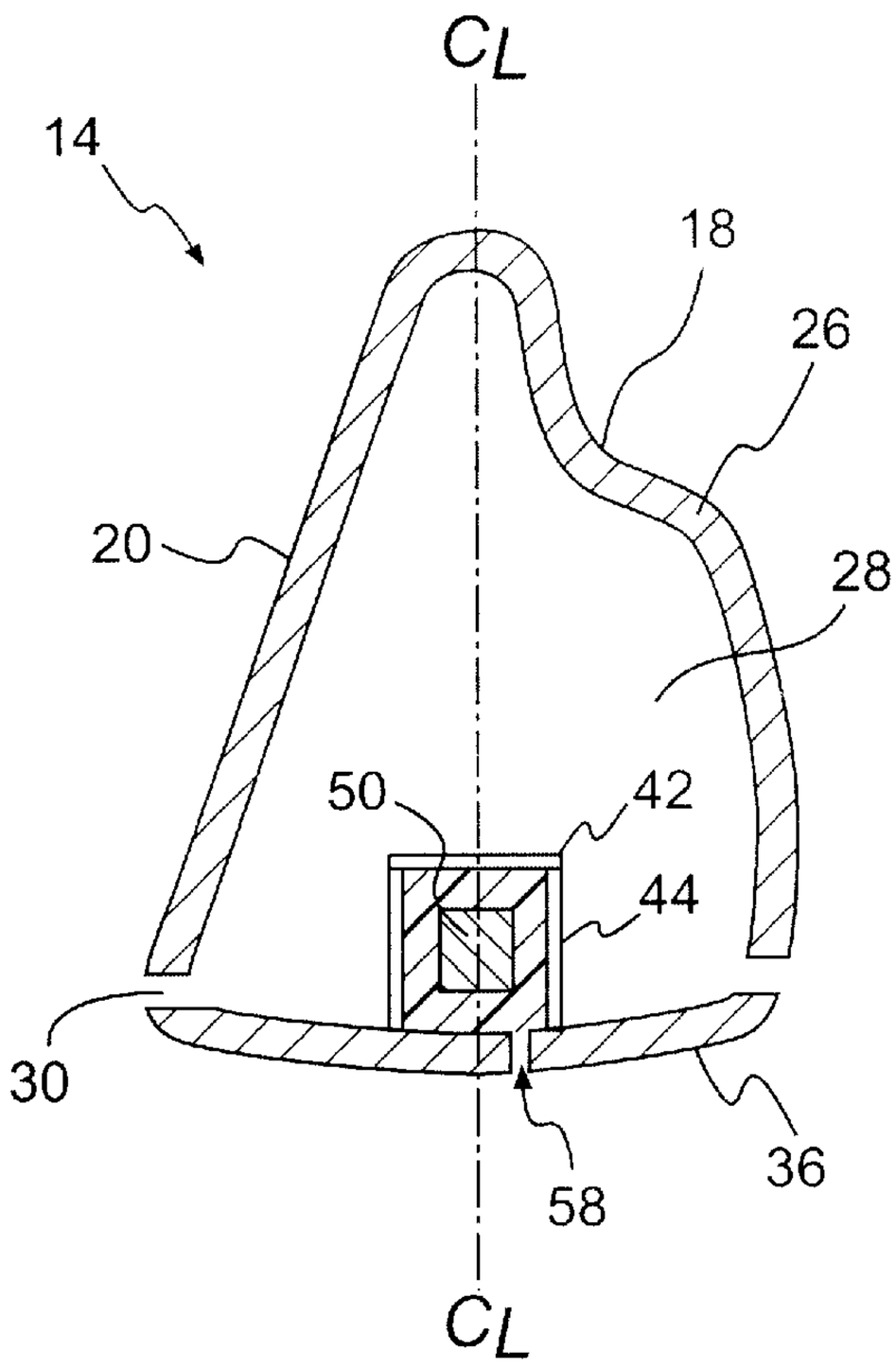

FIG. 2A

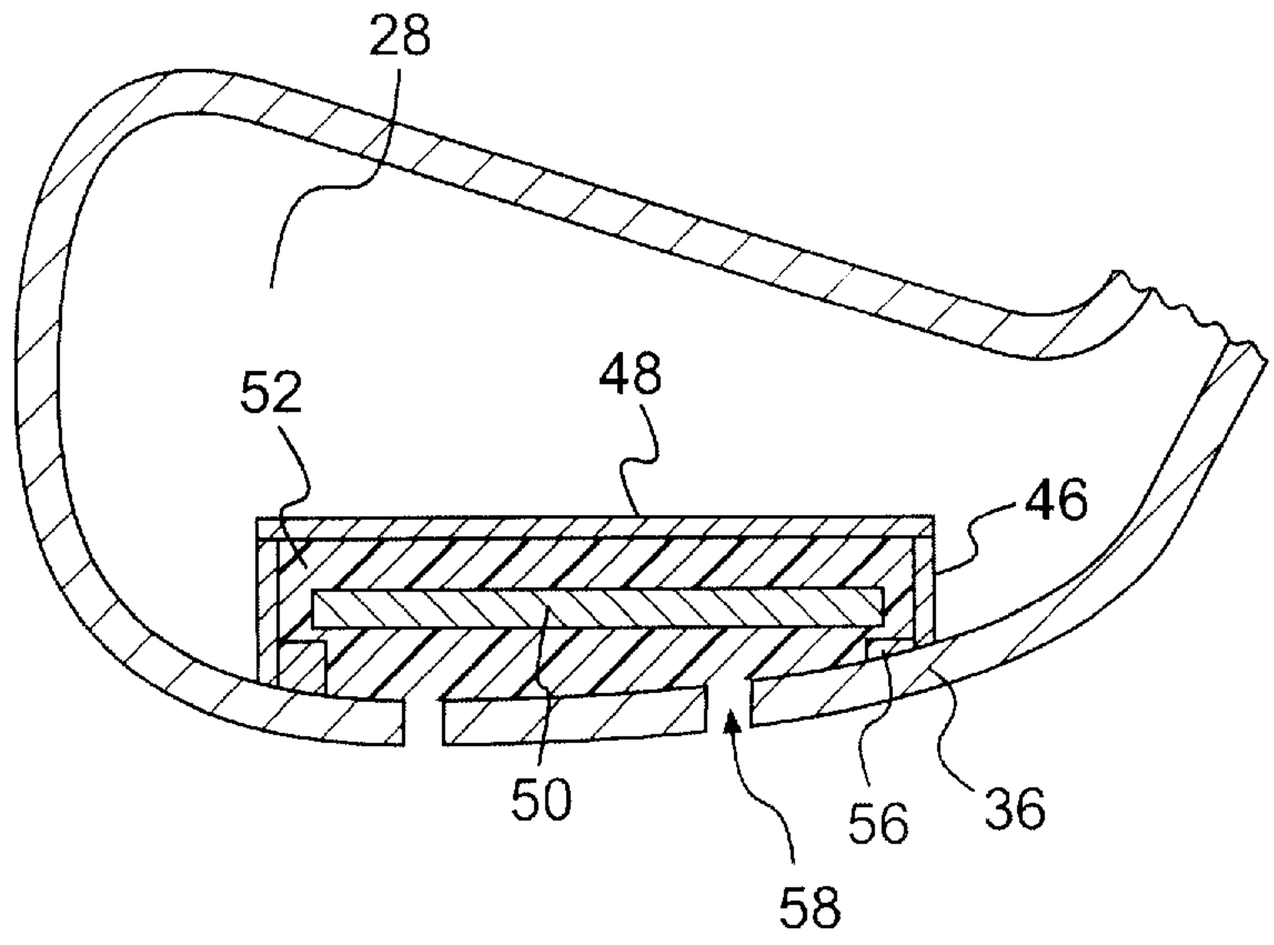

FIG. 2B

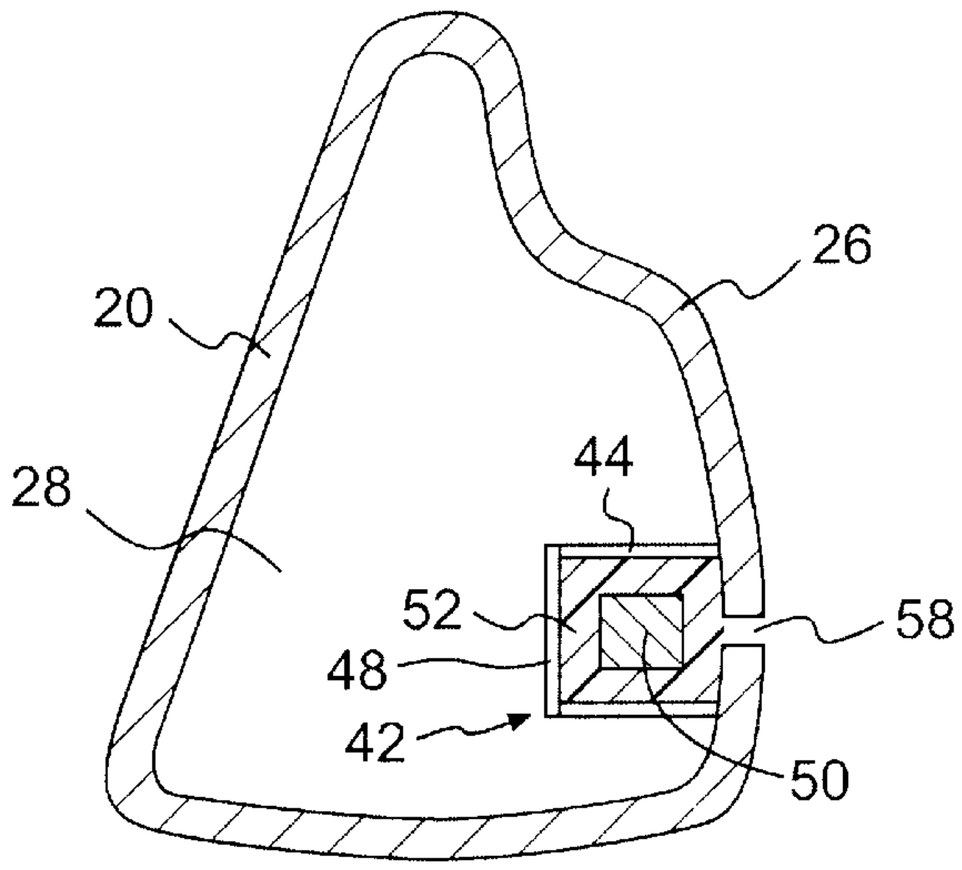

FIG. 3A

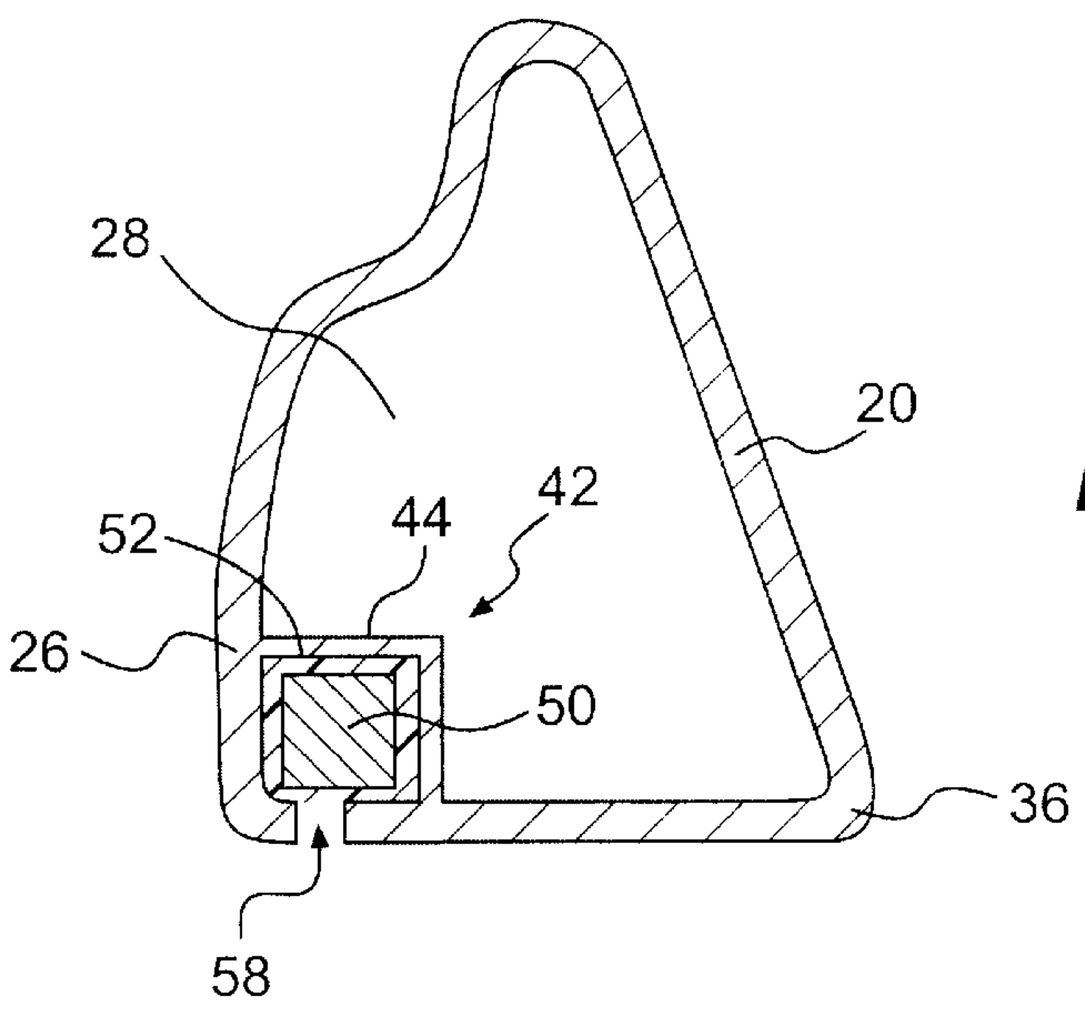

FIG. 3B

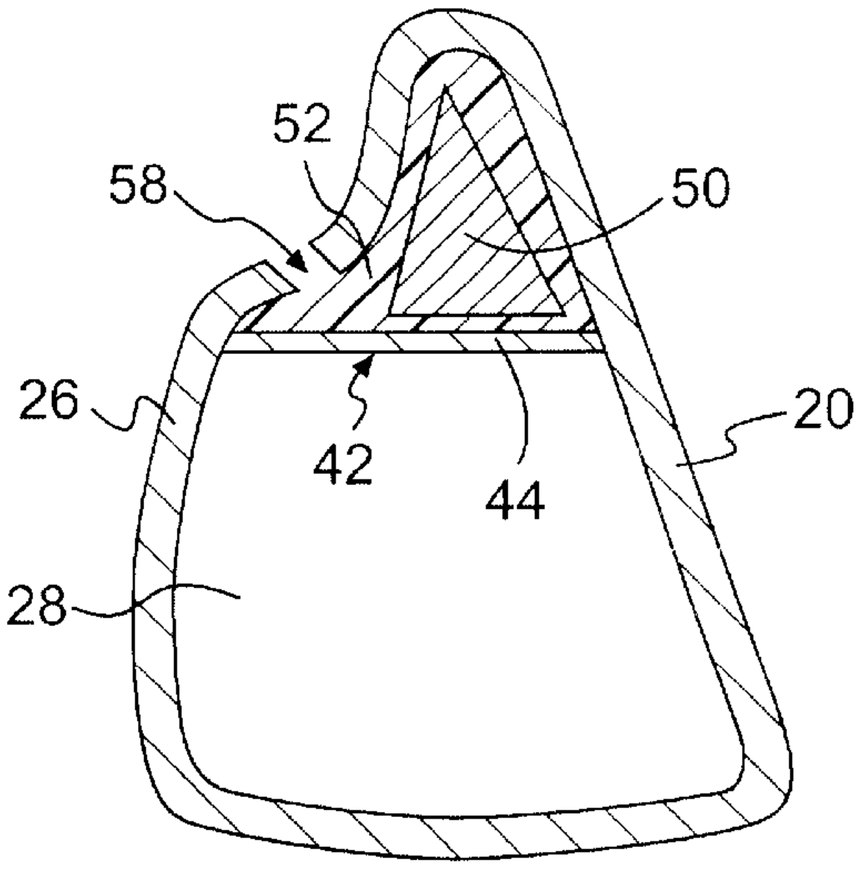

FIG. 3C

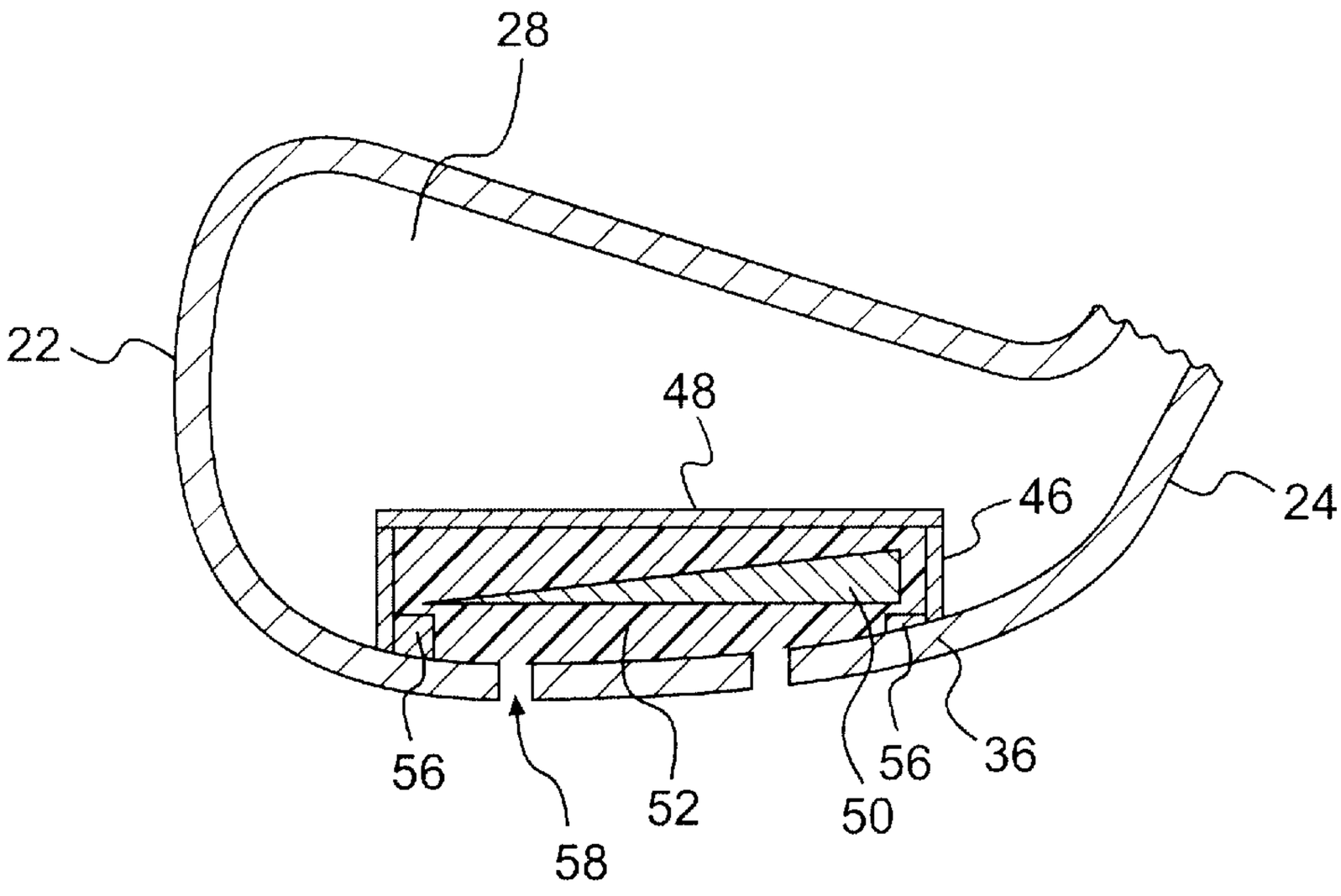

FIG. 4A

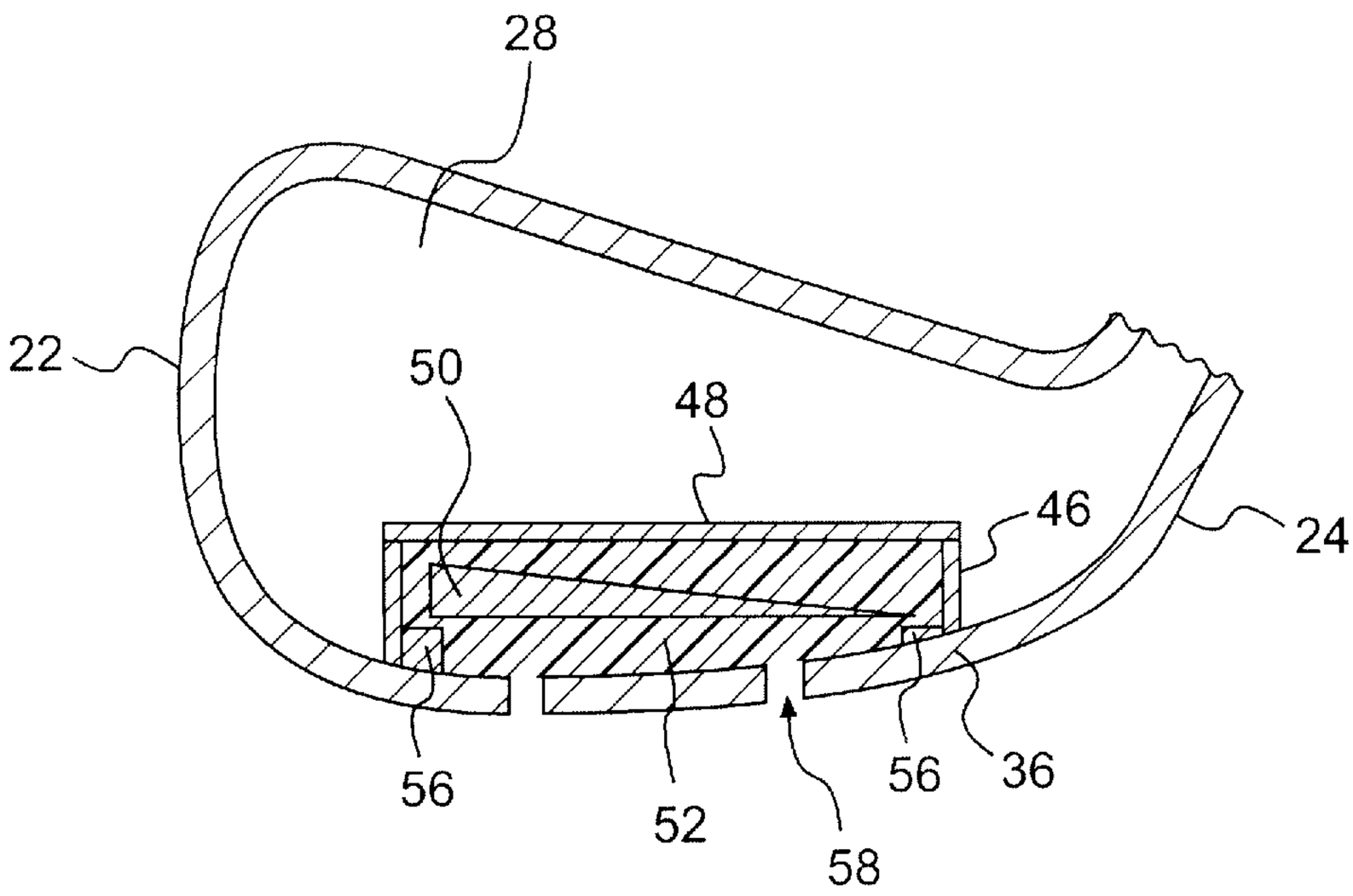

FIG. 4B

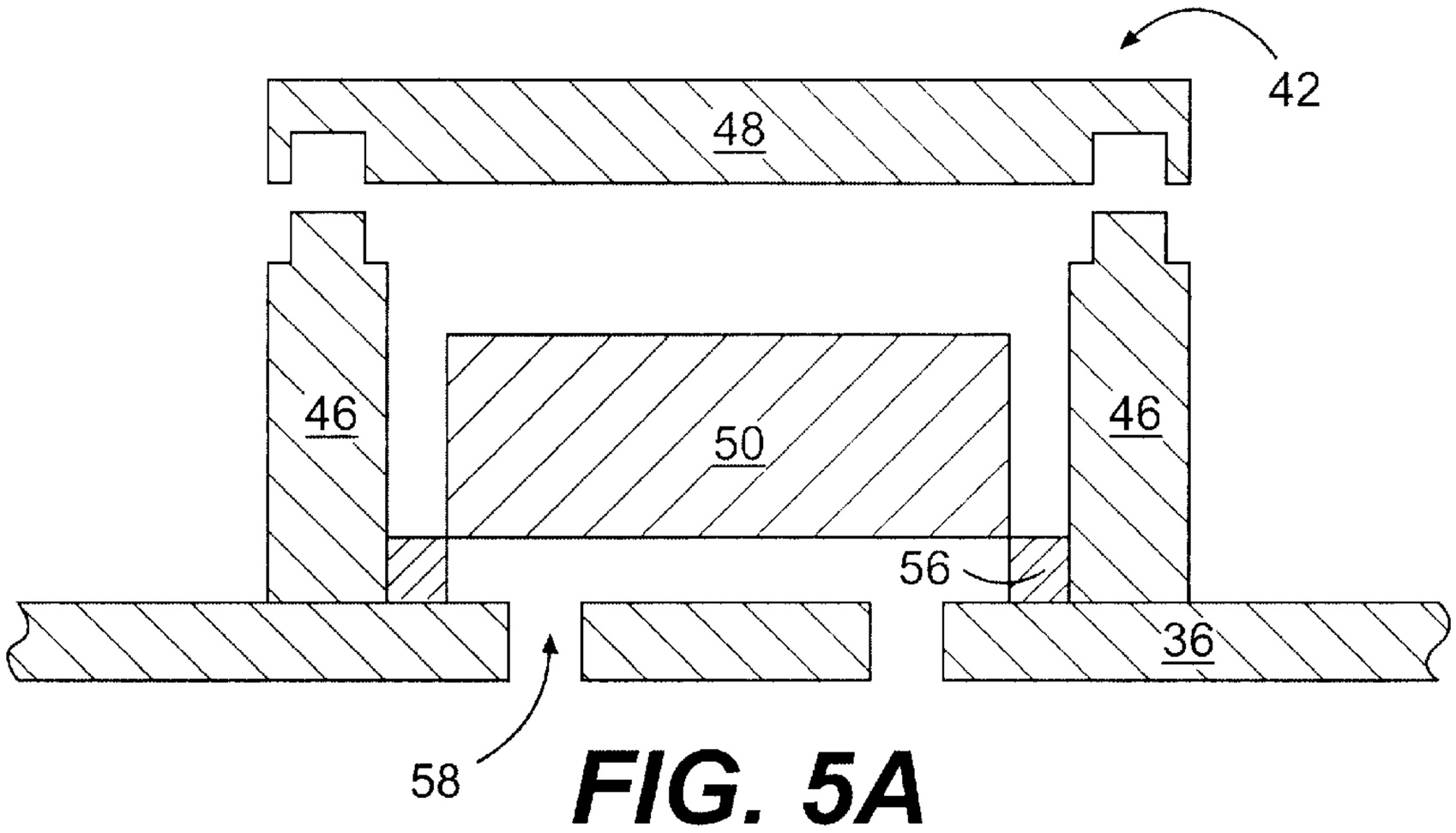

FIG. 5A

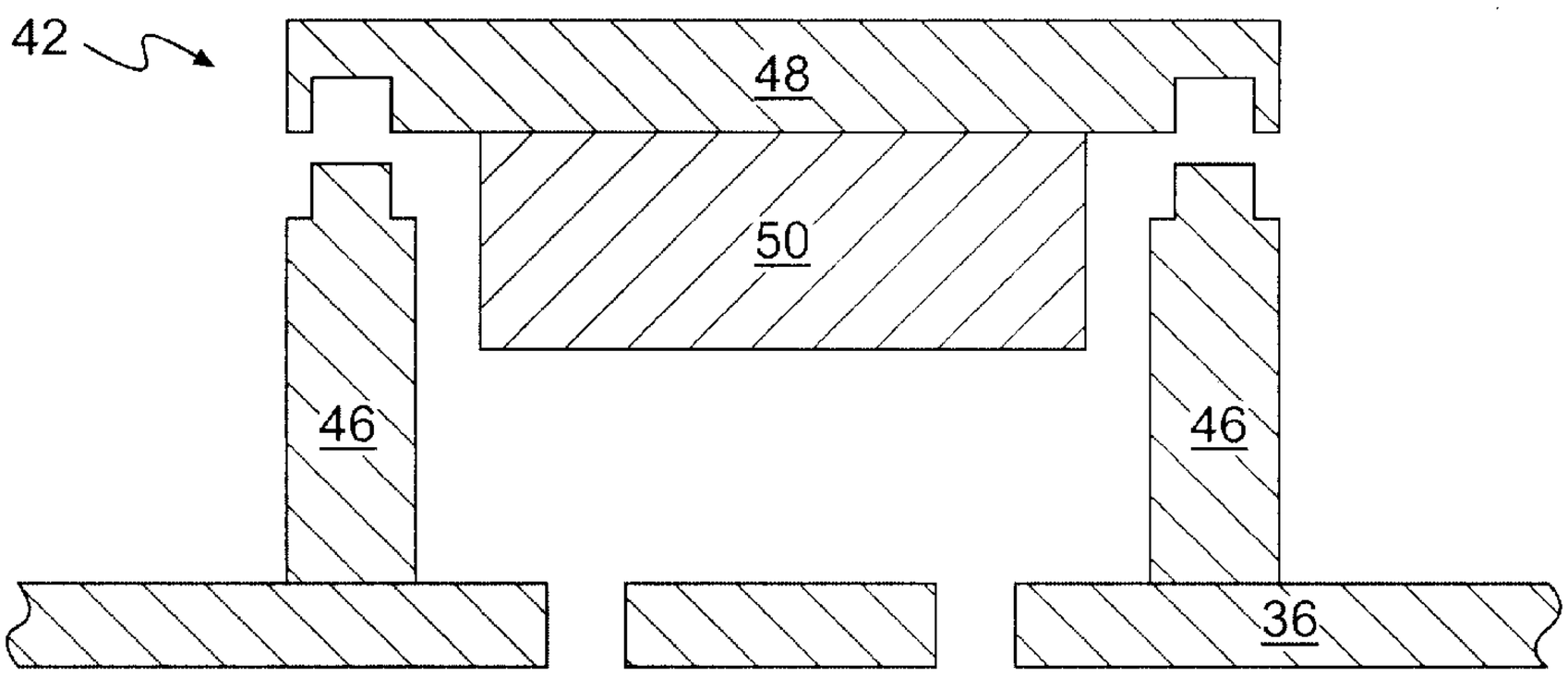

FIG. 5B

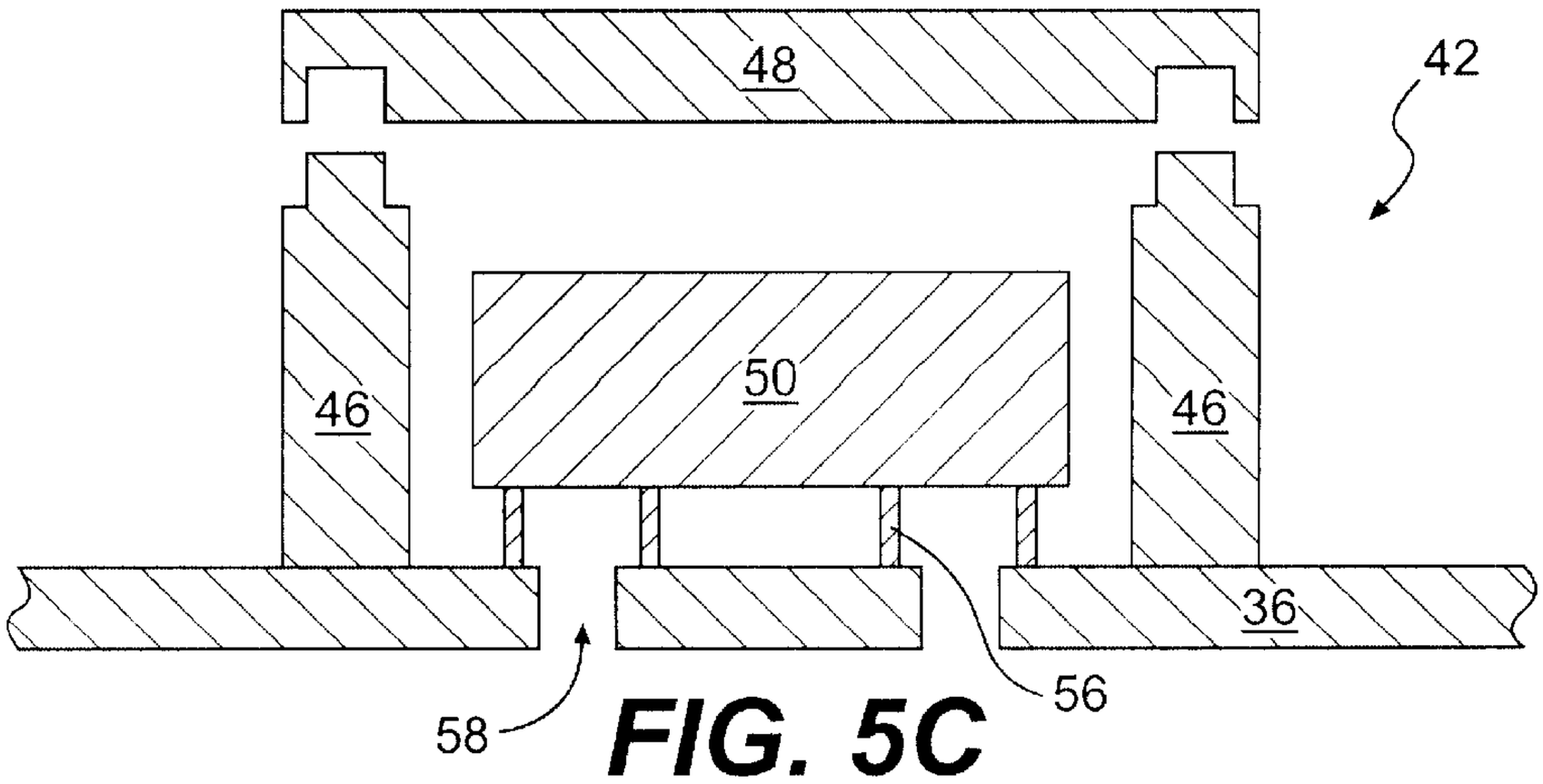

FIG. 5C

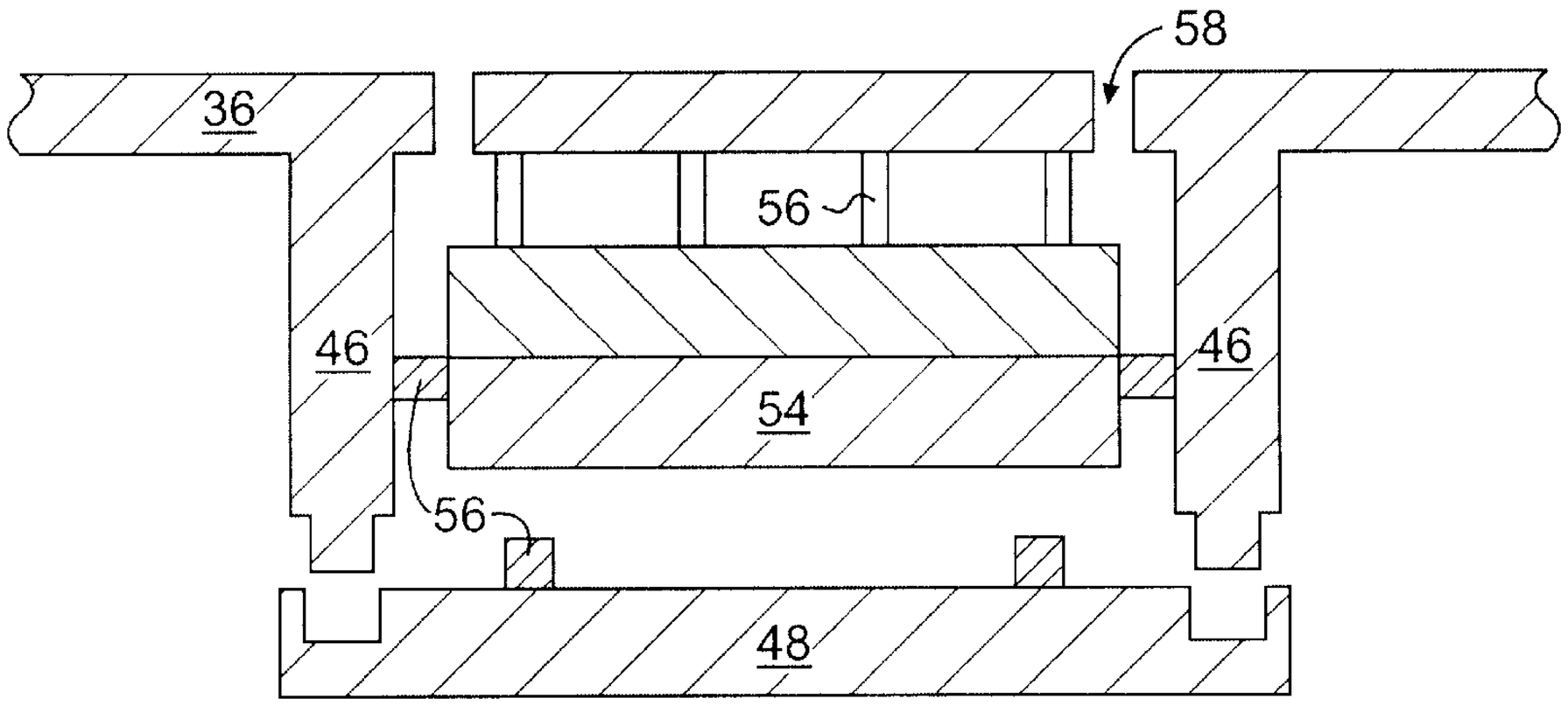

FIG. 6A

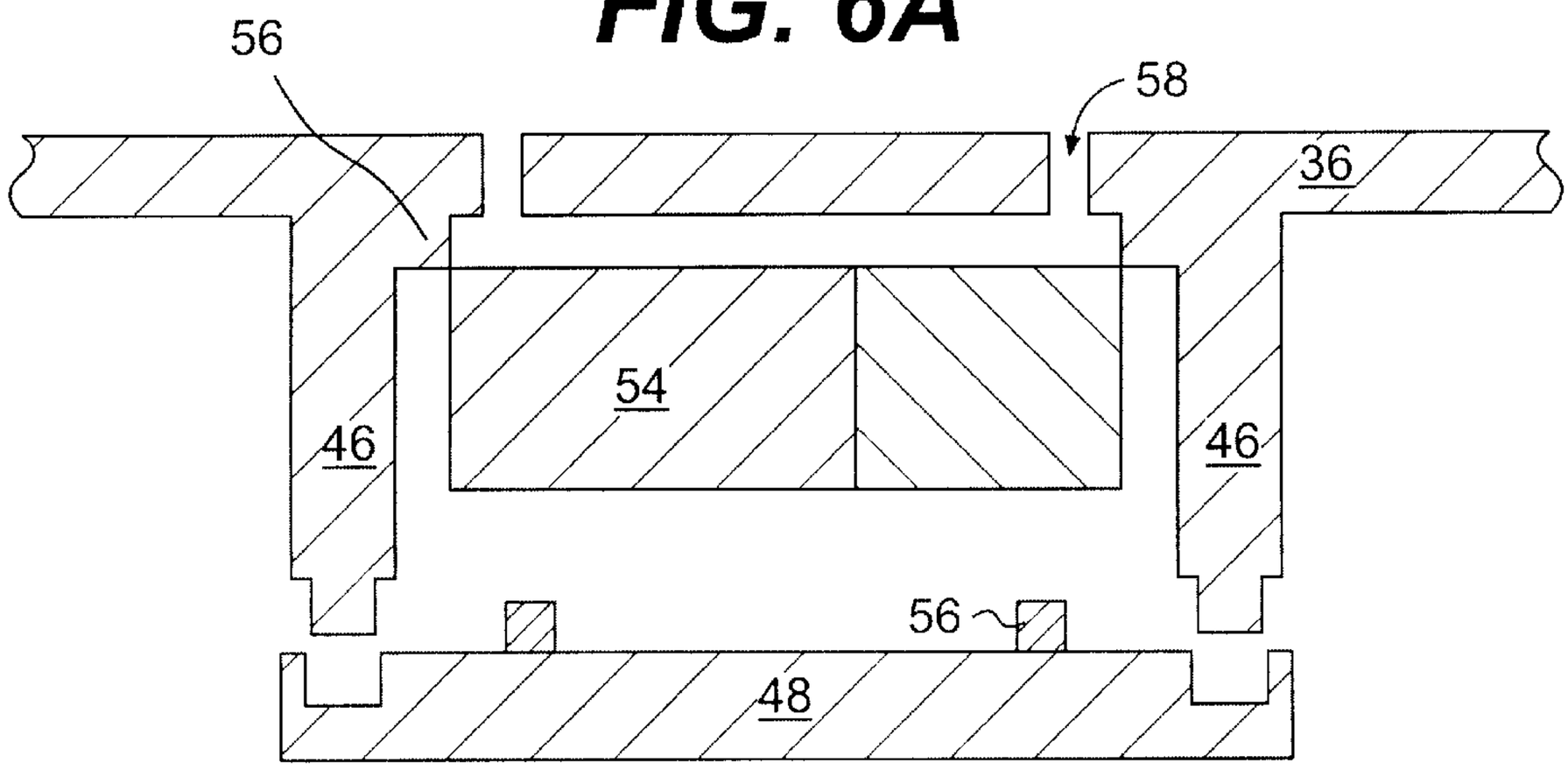

FIG. 6B

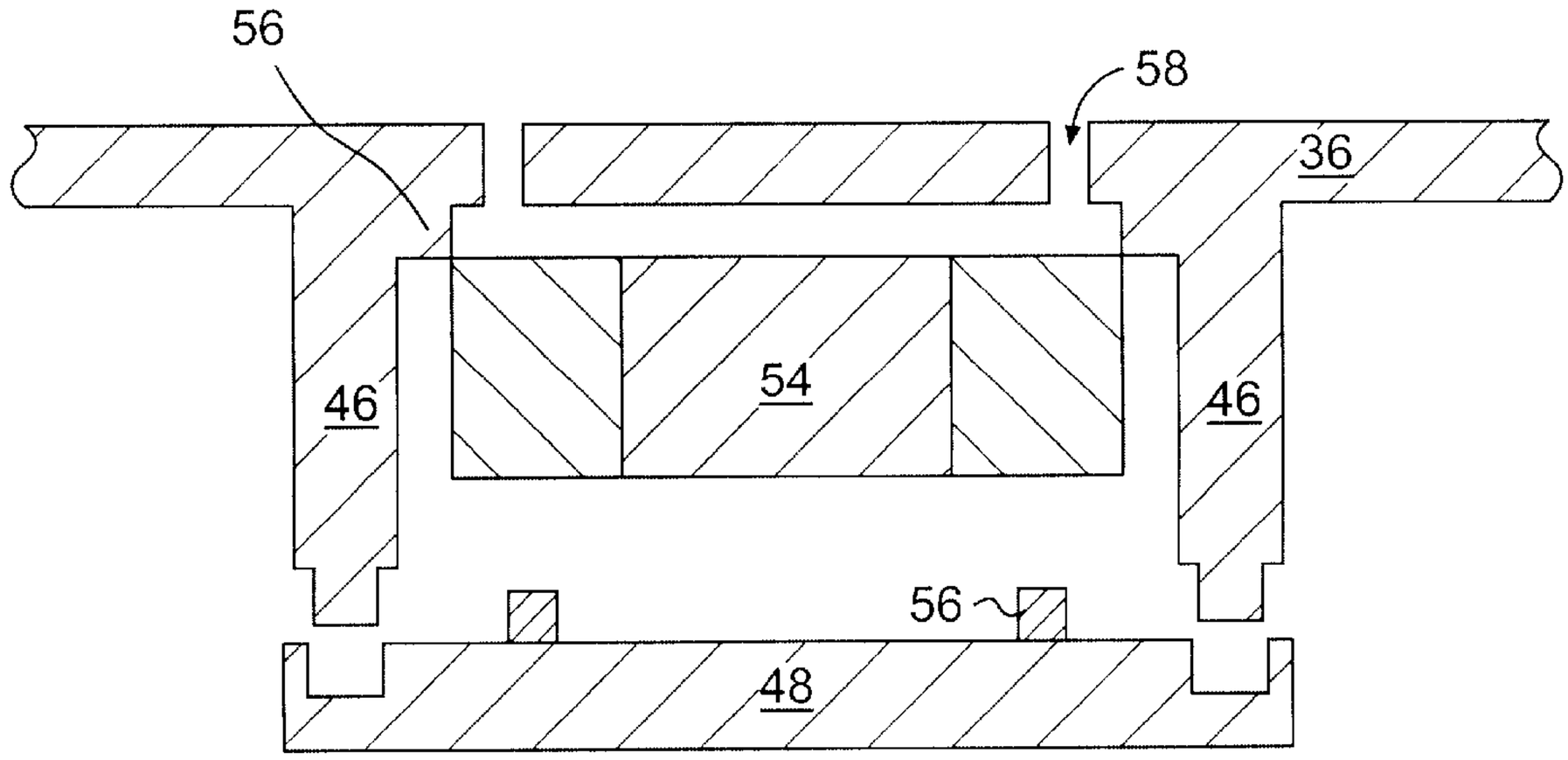

FIG. 6C

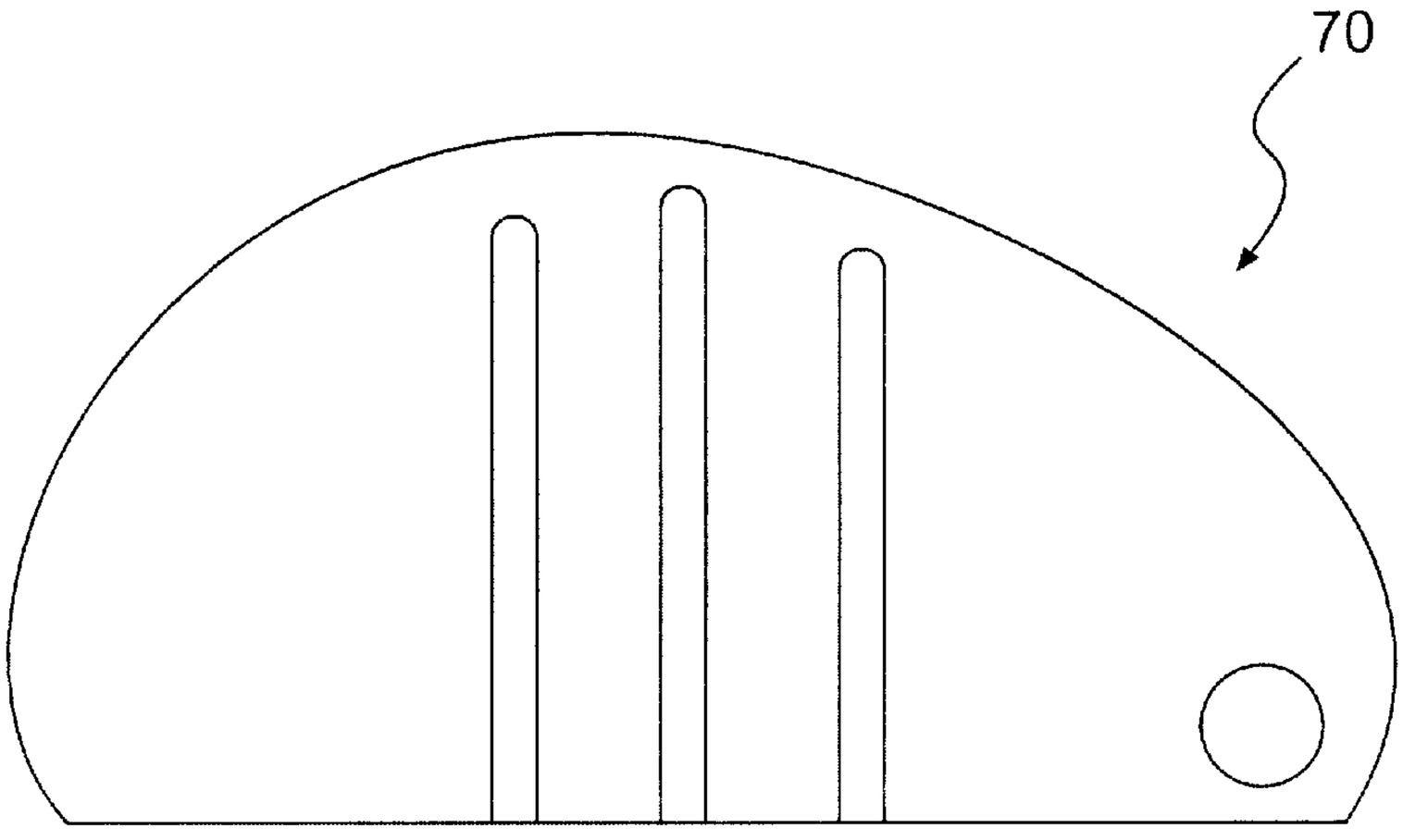

FIG. 7A

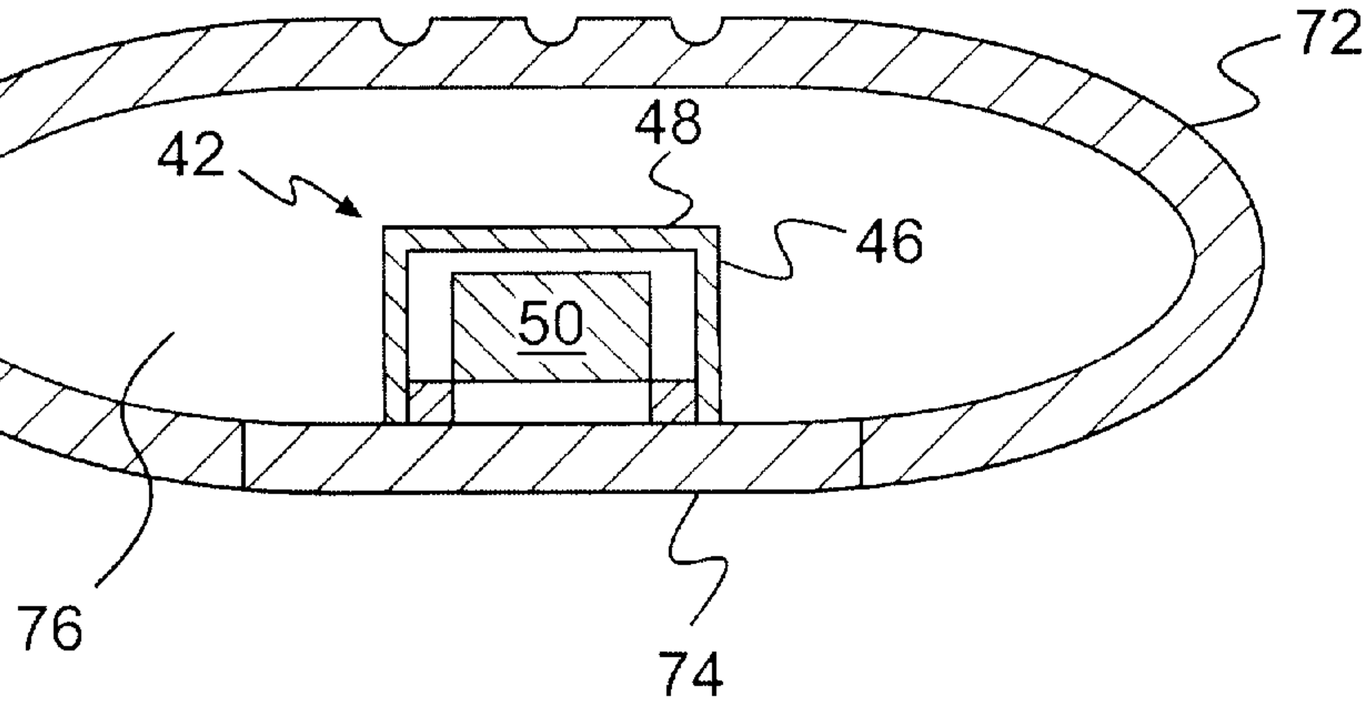

FIG. 7B

HOLLOW GOLF CLUB

FIELD OF THE INVENTION

The present invention relates to golf clubs and, more particularly, to a golf club head that has internal components that allow adjustment of the weight and position of the center of gravity within the club head.

BACKGROUND OF THE INVENTION

There are many different types of golf clubs on the market today available to recreational and professional golfers alike. These clubs include irons, woods, and specialty clubs, such as putters, wedges, and trouble/difficult lie clubs. From the hundreds of choices, golfers face a sometimes overwhelming task when deciding what clubs best suit their game. Golf clubs are generally selected based on a number of criteria, such as shaft length, loft, lie angle, head size, head construction, and swing weight. All of these different clubs are available because of the infinite number of shots that golfers encounter, each and every one of which are played with varying swing types. Because recreational golfers exhibit so many different swings, a club that one golfer hits well, another hits poorly. One type of club, however, that most recreational golfers, and even some professionals, have trouble hitting, are the long irons, such as a 2-iron or a 3-iron. This is because the club face of a 2-iron or a 3-iron is constructed with a low degree of loft. Woods are generally considered to be easier to hit than are irons of the same loft. Woods, however, do not typically afford recreational golfers the same control that irons do.

Although there have been many efforts by manufacturers to make long irons easier to hit or to give wood-type clubs the control afforded by irons, the results of these efforts have, for the most part, been unsuccessful.

U.S. Pat. No. 5,056,705 discloses a method of manufacturing a golf club head having a hollow section, a sole face, and a sole closure. The hollow section of the club head may contain a balance weight mounted to the rear side of the sole closure. No preferred materials for the balance weight are disclosed.

U.S. Pat. No. 5,193,811 discloses a wood type golf club head comprising a head body consisting mainly of a synthetic resin, and a metallic sole plate bonded to the lower surface of the head body. The sole plate has on its surface various members formed integrally therewith which include a hosel on the heel side, weights on the toe side and rear side, and a beam connecting the weights and the hosel. Auxiliary weights, such as brass, tungsten, lead, and zinc, may be added to more specifically position the specific gravity. The auxiliary weights are either buried within the standard weights or are fitted over projections in the surface of the standard weights in a lock-and-key fashion.

U.S. Pat. No. 5,913,735 discloses a golf club head including a hollow head body having a bottom opening and a sole member, both of which are made of titanium or an alloy thereof. An upwardly-opened weight-fitting concave portion is formed on an inner surface of the sole member and a protrusion is formed on the inner surface of the concave portion. A metallic weight is forcibly fitted into the concave portion and the protrusion of the concave portion is forcibly inserted in the bottom surface of the weight so that the weight is fixed in the concave portion. The weight material is preferably lower in hardness and larger in specific gravity than titanium, such as brass or lead.

U.S. Pat. No. 5,935,019 discloses a metallic hollow golf club head comprising a sole plate and a weight of a heavy metal. The sole plate is formed from a light metal and contains a fitting hole. The weight is press-fitted into the fitting hole and extends into the cavity.

It is the intention of the present invention, therefore, to develop a golf club that bridges the gap between irons and woods. The concept of constructing an iron-type golf club that hits like a wood-type club is a novel effort in which the cavity of a wood is coupled with an iron, allowing novel variations to swing weight, weight position (heel or toe weighting), and center of gravity to be adjusted to a particular golfers swing.

The swing weight, in particular, is a club property that takes into consideration the weight of all of the club's components including the head, the shaft, and the grip. Many golfers would prefer to have the swing weight of their clubs match to their individual needs, a feat generally accomplished by custom-making clubs for the golfer. Since custom clubs are expensive, many golfers cannot afford to have the swing weight of their clubs properly matched to their game and swing. As stated above, because club manufacturers must limit the number of clubs that they design and produce, the number of clubs having different swing weights are obviously limited. It is therefore desirable to both golfers and manufacturers to have clubs available in which the swing weight is adjustable after the club is formed. It is the object of the present invention to develop a club head that bridges the gap between irons and woods and further allows customization of the swing weight of the club head in small increments.

SUMMARY OF THE INVENTION

The present invention is directed to a golf club head, wherein the head comprises a front striking face, a back plate, a toe wall, a heel wall, and a sole plate, configured to form an interior cavity; a hosel and a bore for receiving a shaft; at least one chamber formed inside the interior cavity by a plurality of wall members and one of the front striking face, back plate, toe wall, heel wall, and sole plate; a weight member disposed within the chamber; and a filler material juxtaposed the weight member and the wall members forming the cavity such that the weight member is isolated from at least one of the wall members and is securely held within the chamber.

In one embodiment, the chamber is attached to the sole plate. Preferably, the chamber is further attached to at least one of the front striking face, back plate, toe wall, or heel wall. In another embodiment, the weight member is of unitary construction. In a preferred embodiment, the weight member has a horizontal cross-section that is substantially rectangular and a vertical cross-section that is substantially square. In another embodiment, the weight member has an inhomogeneous longitudinal thickness. Preferably, the weight member has a mass of between about 55 grams and about 110 grams.

In still another embodiment, the club head has a first mass and the weight member has a second mass that is between about 25% and 50% of the first mass. The weight member can be symmetrically disposed within the chamber or, alternatively, the weight member can be isolated from the all of the wall members by a plurality of supports. Preferably, the weight member comprises tungsten, copper, molybdenum, lead, alloys thereof, and mixtures thereof. In another embodiment, the weight member comprises a plurality of weight member parts. In yet another embodiment, the weight member parts each have different densities.

In one embodiment, the sole plate has at least one aperture for receiving a plug. In another embodiment, the aperture is

threaded. In still another embodiment, the chamber has a first volume and the weight member has a second volume that is greater than about 50% of the first volume. Preferably, the second volume is greater than about 80% of the first volume.

In another embodiment, the filler material is selected from the group consisting of adhesive, glue, caulking material, thermosetting or thermoplastic resins, epoxy, and mixtures thereof. In a preferred embodiment, the filler material is epoxy.

The present invention is also directed to a metal-wood club head, wherein the head comprises a front striking face, a back plate, a toe wall, a heel wall, a sole plate, a crown, and an arcuate skirt, configured to form an interior cavity; hosel and a bore for receiving a shaft; at least one chamber formed inside the interior cavity by a plurality of wall members and one of the front striking face, back plate, toe wall, heel wall, sole plate, crown, and arcuate skirt; a weight member disposed within the chamber; and a filler material juxtaposed the weight member and the wall members forming the cavity such that the weight member is isolated from at least one of the wall members and is securely held within the chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a cross-sectional view of the head of the present invention.

FIG. **1**B is a front, perspective view of a golf club of the present invention.

FIG. **1**C is a back, perspective view of the golf club of the present invention.

FIG. **2**A is a horizontal cross-sectional view of the head of the present invention.

FIG. **2**B is a vertical cross-sectional view of the head of the present invention.

FIG. **3**A is a cross-sectional view showing another embodiment of the club head of the present invention where the chamber is attached to the back plate.

FIG. **3**B is a cross-sectional view showing another embodiment of the club head of the present invention where the chamber is attached to the sole plate and the back plate simultaneously.

FIG. **3**C is a cross-sectional view showing another embodiment of the club head of the present invention where the chamber is defined by the inner surfaces of the front striking face, the back plate, and the sole plate.

FIG. **4**A is a cross-sectional view showing another embodiment of the club head of the present invention where the weight member provides heel weighting by having increasing thickness in the toe to heel direction.

FIG. **4**B is a cross-sectional view showing another embodiment of the club head of the present invention where the weight member provides toe weighting by having increasing thickness in the heel to toe direction.

FIG. **5**A is a cross-sectional view showing another embodiment of the chamber of the present invention where the weight member is supported in the chamber by support members.

FIG. **5**B is a cross-sectional view showing another embodiment of the chamber of the present invention where the weight member is secured in the chamber by attachment to the cap.

FIG. **5**C is a cross-sectional view showing another embodiment of the chamber of the present invention where the weight member is supported in the chamber by pins.

FIG. **6**A is a cross-sectional view showing another embodiment of the chamber of the present invention where the weight member comprises two layers of differing material and is secured in the chamber by a plurality of support members.

FIG. **6**B is a cross-sectional view showing another embodiment of the chamber of the present invention where the weight member comprises two blocks of differing material and is secured in the chamber by support members.

FIG. **6**C is a cross-sectional view showing another embodiment of the chamber of the present invention where the weight member comprises three blocks of differing material, one material disposed between two blocks of the second material, and is secured in the chamber by support members.

FIG. **7**A is a top view showing another embodiment of the present invention where the weight member is in a club head such as a putter.

FIG. **7**B is a cross-sectional view showing another embodiment of the present invention where the weight member is contained in a chamber defining a putter club head and is located on a removable sole plate.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. **1**A–**1**C, a golf club **10** has a shaft **12** (only partially shown) with a club head **14** and a grip **16** attached to opposing ends. The club head **14** has a body **18** including a front striking face **20**, a toe wall **22**, a heel wall **24**, and a back plate **26**, the combination of which define a cavity **28** rearward of the front striking face **20**. The golf club further contains a hosel **32** having a bore **34** for receiving a shaft **12**.

Referring to FIGS. **1**B and **2**A, the body **18** defines a bottom opening **30**. The club head **14** further includes a sole plate **36**, which is configured to cover the opening in the bottom of the body **18**. In the preferred embodiment, the golf club head is formed of two separate pieces: the body **18** and the sole plate **36**, which is preferably an assembly comprising a plurality of components, such as a chamber, cap plate, weight member, and a filler, that are discussed in more detail below. However, in other embodiments, the club head can be formed of at least three parts, as is well-known to one of ordinary skill in the art.

Referring to FIGS. **1**A–**2**A, a hosel **32** extends from the heel wall **24**. The hosel **32** defines a bore **34** for accepting the shaft **12**. The bore **34** in the hosel **32** can be a conduit into the interior cavity **28**. In one embodiment, the hosel **32** forms a shaft through the body **18** of the club head **14** to a lower corner portion of the sole plate **36**. The sole plate **36** is preferably of unitary construction but may include an aperture to receive the shaft **12**. In this embodiment, the shaft **12** extends through the entire club head **14** to the aperture in the sole plate **36**. In the preferred embodiment, the hosel **32** contains an aperture for receiving the shaft **12** that does not extend through the hosel **32** into the interior cavity **28**.

As seen in FIG. **1**B, the cavity **28** of the club head **14** includes a chamber **42** coupled to and extending from the interior surface of the cavity **28**. The chamber **42** is defined by a wall structure having a chamber volume therein. The chamber **42** is preferably attached to the sole plate **36**, but could, for example, be attached to the inside of the front striking face **20**, the back plate **26**, the top of the cavity **28**, or to both the front striking face **20** and the sole plate **36** simultaneously, as depicted in FIGS. **3**A–**3**C. Preferably, the

chamber **42** includes at least one side wall member **44**, at least one end wall member **46**, and a cap **48**. In one embodiment, damping material is placed between the walls of the chamber **42** and the inner cavity surface. In another embodiment, the sole plate **36** and chamber **42** are formed separately and connected using conventional techniques, such as by welding or gluing.

Referring to FIGS. **2**A and **2**B, the chamber **42** preferably has a horizontal cross-section that is rectangular in shape and a vertical cross-section that is square in shape, defined by the at least one side wall member **44** and the at least one end wall member **46**, but could also have a non-symmetrical or non geometric (no mirror image) cross-section, such as a triangular cross-section or one that follows the profile of sole plate **36**. In an alternative embodiment, the chamber **42** has walls that are not perpendicular to the sole plate **36**, such as walls defined by a pyramidal structure.

The cap **48** is preferably of unitary construction and may be attached to the chamber **42** by a plurality of means including welding, gluing, press fitting, or by a tongue and groove manner. The preferred method for securing the cap **48** to the chamber **42** is by press fitting. The cap **48** may also be formed integrally with the wall members. The cap **48** may additionally contain "cleats" to secure any contents therein.

Referring to FIGS. **2**A and **2**B, the chamber **42** is disposed on the sole plate **36** so that it is generally centered with respect to the centerline, C_L, of the club head **14**. As a result, the chamber **42** is generally centered between the heel wall **24** and the toe wall **22** in the transverse direction within the club head **14**. The chamber **42** may also be adjacent the rearmost edge of the sole plate **36** or the back plate **26** of the club head, as depicted in FIGS. **3**A and **3**B.

In a preferred embodiment of the present invention, the chamber **42** contains at least one weight member **50** and a filler material **52** disposed therein. The weight member **50** is disposed in the chamber **42** and the filler material **52** is juxtaposed in the remaining volume. Referring to FIGS. **3**A–**5**C, the weight member **50** can be any structure, such as a rectangle or square, or have any cross-section, such as a rectangular or triangular cross-section. Preferably the weight member **50** is rectangular in both shape and cross-section. The weight member **50** may be of unitary construction or it may comprise a plurality of weight member parts **54**, such as depicted in FIGS. **6**A–**6**C. The weight member parts may be of the same or of differing material or densities. If the weight member **50** comprises two materials of differing densities, they may be in the form of layers or two pieces end-to-end to allow the center of gravity of the club head **14** to be adjusted in a number of ways, such as up/down, front/back, or heel/toe. The weight member parts **54** may be separate or attached together by a plurality of means, such as by welding, gluing, or press-fitting. In one embodiment, the volume of the weight member **50** is greater than about 50% of the volume of the chamber **42**. In a preferred embodiment, the volume of the weight member **50** is greater than about 80% of the volume of the chamber **42**. The weight member **50** can be constructed of any material. Recommended weight member materials are tungsten, copper, molybdenum, lead, alloys thereof, and mixtures thereof. Preferably, the material has a different density than the density of the club head material. However, the present invention is not limited to these weighted materials, for example a weighted material like molten metal can be liquified and poured into the chamber where it can harden. The preferred weighted material is tungsten or tungsten powder, for example the commercially available tungsten powder manufactured by Polese.

Referring to FIGS. **5**A–**5**C, the weight member **50** may be placed in the chamber **28** in any location but is preferably in the center. If the weight member **50** comprises a non-uniform shape or contains materials of differing densities, it may be mounted such that heavy section is either toeward or heelward to provide the club head **14** with toe or heel weighting. The weight member **50** is typically held in center of the chamber **42** by supports **56** located, for example, in the comers of chamber **42** such that the weight member **50** has a void on all sides. Preferably, the weight member **50** is symmetrically disposed within the chamber. However, the location of the weight member **50** within the chamber may be asymmetrical as desired by the manufacturer to allow for adjustment of the center of gravity of the club head **14**. The center of gravity may be adjusted a number of ways, including, but not limited to, up/back, front/rear, and heel/toe. The supports **56** may have any shape or dimension but preferably have a small volume and cross-section compared to that of the weight member **50**. The supports **56** may be of differing heights such that weight member **50** is held at an angle with respect to the cap **48** or the at least one side wall member **44**. For example, the weight member **50** may be supported in center of the chamber **42** by a plurality of pins on the sole plate **36**. If desired, the supports **56** may be shaped to aid in securing the weight member **50** within the chamber **42**. In one embodiment, the weight member **50** attached to the optional cap **48**. If desired, a damping material may be placed between the cap **48** and the weight member **50**. In a further embodiment, the weight member is secured by a spring-like structure that provides pressure against the weight member **50** and the at least one side wall member **44** or cap **48**.

Referring again to FIGS. **2**A and **2**B, the filler material **52** is disposed between the weight member **50**, the walls of the chamber **42**, and the sole plate **36**, to aid in securing the weight member **50** within the chamber **42**. The volume of the weight member **50** and the volume of the filler material **52** substantially equals the volume of the chamber **42**. The weight member **50** preferably has a predetermined weight, density, or specific gravity, that allows the weight distribution in the club head **14** to be altered prior to manufacture. The center of gravity may be adjusted a number of ways, including, but not limited to, up/back, front/rear, and heel/toe. The filler material **52** should have a weight that is substantially less than the weight of the weight member **50**. Since the filler material **52** weighs substantially less than the weight member **50**, the club head **14** is configured such that the weight member **50** is suspended or spaced from the sole plate within the club head. In one embodiment, however, at least a portion of the weight member **50** penetrates through the sole plate **36** such that it is exposed to the outside of the club head **14**.

FIG. **2**A is a preferred embodiment of the present invention. The chamber **42** is disposed within the cavity **28** of the club head **14** such that it is centered along the center line, C_L, on the sole plate **36**. As described above, the chamber **42** can be of any construction, but is preferably a rectangular structure having two side wall members **44**, two end wall members **46**, and a cap **48**. Disposed within the chamber **42** is the preferred weight member **50**, a rectangular structure. The weight member **50** is disposed within the chamber **42**, such that it is symmetrically separated from the side wall members **44**, the end wall members **46**, and the cap **48**. The void between these chamber parts allows the remaining volume of the chamber **42** to be filled with a filler material **52**, such as an epoxy. Preferably the filler material **52** is placed within the chamber **42** through at least one aperture **58** in the sole plate **36**.

FIGS. **3**A–**3**C depict alternative embodiments of the current invention. In one embodiment, the chamber **42** is attached to the back plate **26**. In another embodiment, the chamber **42** is attached simultaneously to the sole plate **36** and the back plate **26**. In still another embodiment, the chamber **42** is formed by connecting the inner surfaces of the front striking face **20** and the back plate **26** with a side wall member **44**. If desired, the weight member **50** may be altered in shape so as to substantially fit the cavity created by the side-wall member **44**, the front striking face **20**, and the back plate **26**. It should be obvious to one of ordinary skill in the art that these different embodiments allow precise control of the center of gravity within the club head **14** in a variety of directions and/or locations.

In an alternative embodiment, as seen in FIGS. **4**A and **4**B, the weight member **50** located within the chamber **42** is constructed in a non-symmetrical geometry. By varying the thickness of the weight member **50**, the center of gravity can be precisely positioned at a predetermined point between the heel wall **24** and the toe wall **22**.

Referring to FIGS. **5**A through **5**C, alternative embodiments for enclosing the chamber are depicted. In FIG. **5**A, the weight member **50** rests on supports **56** located between the end walls **46** which are all attached to the sole plate **36**. The chamber **42** is enclosed by attaching a cap **48** in a tongue and groove manner. FIG. **5**B depicts another embodiment of the present invention in which the weight member **50** is secured to the cap **48** before enclosing the chamber **42**. In another embodiment of the chamber **42**, as can be seen in FIG. **5**C, the weight member **50** is supported with the volume of the chamber **42** by a plurality of supports **56**, such as pins.

Referring now to FIGS. **6**A–**46**C, alternative embodiments of current invention are depicted that involve weight members comprising weight member parts **54**. Preferably, the weight member parts **54** are of two different materials, each having a substantially different density. In FIG. **6**A, the weight member **50** comprises two layers different materials adhered to each other. The at least two parts of the weight member **50** may be secured together in any manner, such as by welding or gluing. The weight member **50**, as seen in FIG. **6**A, is held in the center of the chamber **42** by a plurality of supports **56**. The at least two materials that comprised the weight member **50**, are preferably of differing densities, such that the center of gravity of the club head **14** may be adjusted. The center of gravity may be adjusted a number of ways, including, but not limited to, up/back, front/rear, and heel/toe. FIG. **6**B depicts a weight member **50** comprised of at least two differing materials, preferably of differing densities, such that the center of gravity of the club head **14** may be adjusted between the heel and toe of the club. FIGS. **6**C depicts a weight member **50** having at least two differing materials with one material of a first density being located between two pieces of a second material having a second density. Again, this multiple material weight member **50** allows the manufacturer to have fine control over the location of the center of gravity within the club head **14**.

Moreover, the weight members allow the manufacturer to have fine control over the final weight of the club head such that the club head weight can be adjusted for different swing weights and/or different weighted shafts. For example, weight members **50** can come in various sizes, e.g., large and small, to accommodate changing the club head weight without altering any other parameters.

The sole plate **36** preferably has at least one aperture **58** such that access to the interior volume of the chamber **42** is provided. It is through this aperture **58** that the filler material **52** enters the chamber **42**. In one embodiment, the sole plate **36** contains a second aperture **58** to allow air to escape as the filler material **52**, preferably epoxy or glue, enters the void around weight member **50**. When the volume of the chamber **42** is full of filler material **52**, the at least one aperture **58** receives a threaded or press-fit plug **60**. If desired, an epoxy-like material may be used to secure the plug **60**.

The filler material **52** has a fluid state so that it is injectable into the chamber **42** through the aperture **58**. The filler material **52** also has a set state where the material has changed into a solid or gel. Once the filler material sets, it secures the weighted material within the chamber in its respective section. Recommended filler materials include, but are not limited to, adhesive, glue, such as hot melt, caulking material or thermosetting resins, thermoplastic resins, epoxy, or mixtures thereof. Preferably, the filler material **52** is epoxy.

In the preferred embodiment, the plug **60** is formed of plastic and has a truncated conical shape. The plug **60** is sized so that when it is inserted into the threaded aperture **58**, the threads of the aperture **58** dig into the surface of the plug **60** and secure the plug within the sole plate **36**. An adhesive, glue or epoxy is applied to the plug **60** prior to insertion in the sole plate to further secure it therein. The use of the adhesive, glue, or epoxy with the plug is optional.

Dimensions, such as the internal diameter and height, of the at least one side wall member **44** and end wall member **46**, can vary depending on the weight requirements desired. Similarly, the thickness and diameter of the cap **48** can vary. The dimensions of these components dictate the volume of the chamber **42** and, thus, the maximum volume of weight member **50** and filler material **52** that is disposed therein. One of ordinary skill in the art can determine the dimensions of the at least one side wall member **44**, at least one end wall member **46**, and cap **48** depending on the desired chamber volume.

The weight member **50** preferably has mass of between about 55 grams and about 110 grams. The mass of the weight member **50**, in a more preferred embodiment, is about 75 grams. The mass of the weight member **50** is typically between about 25% and about 50% of the total mass of the club head **14**. Preferably, the mass of the weight member **50** is typically between about 35% and about 40% of the total mass of the club head **14**.

The body **14** and sole plate **36** are typically cast from conventional materials. The toe wall **22**, heel wall **24**, and back plate **26** may be cast integrally with the sole plate **36**. The chamber **42** is attached to the inner surface of the cavity **28** as desired. Preferably, the chamber **42** is attached to the sole plate **36**. If desired, the aperture **58** is also cast into the sole plate in a location corresponding to the chamber **42**. Once these components are formed, the sole plate **36** is attached to the body **14**, such as by welding. The internal threads in the aperture **58** are formed by conventional methods.

In one embodiment, a water-based foam is injected into the interior cavity **28** of the club head **14** through the hosel bore **34**. In another embodiment, the cavity **28** may be filled, partially or fully, with a foam material, such as polyurethane, by way of the bore **34** and plurality of holes therein. In another embodiment, a conventional means, such as a bore through one of the body walls, is used to fill the interior cavity with foam.

In another embodiment of the current invention, directed to a metal-wood type club head, the club head comprises a

crown and an arcuate skirt. The metal wood further contains a hosel having a bore for receiving a shaft. The front striking face, the toe wall, the heel wall, the back plate, the sole plate, the crown, and the arcuate skirt, are combined to form a body having a cavity. The chamber of the current invention may be attached to any interior surface of the cavity. Preferably, the chamber is attached to the sole plate in the manner described above. In an additional embodiment, the chamber may be attached to the crown of the metal wood to allow the center of gravity of the club head to be raised. Additionally, at least one chamber may be attached to various locations on the crown such that the center of gravity is further placed towards the heel or the toe of the club head. The center of gravity may also be adjusted a number of other direction, such as up/back or front/rear.

Referring to FIGS. **7**A and **7**B, an alternative embodiment of the present invention is directed to a putter, such as a mallet-style putter **70**. The club head of the putter generally comprises a hollow body **72**, forming a cavity, and a sole plate **74**. The putter further contains a hosel **76** having a bore for receiving a shaft. The chamber **42** of the present invention may be attached to any interior surface of the cavity **76** or the sole plate **74**. Preferably, the chamber is attached to the sole plate **74** in the manner described above. The chamber **42** may also be attached to a variety of locations on the inner surface of the cavity **76** to allow the center of gravity of the putter to be adjusted, such as towards the heel or the toe, up/back, or front/rear of the club head. In an alternative embodiment, the sole plate **74** is removable such that chambers having a different mass may be added or changed.

The term "about," as used herein in connection with one or more numbers or numerical ranges, should be understood to refer to all such numbers, including all numbers in a range.

The invention described and claimed herein is not to be limited in scope by the specific embodiments herein disclosed, since these embodiments are intended solely as illustrations of several aspects of the invention. Any equivalent embodiments are intended to be within the scope of this invention. Indeed, various modifications of the invention in addition to those shown and described herein will become apparent to those skilled in the art from the foregoing description. Such modifications are also intended to fall within the scope of the appended claims.

What is claimed is:

1. A golf club head, wherein the head comprises:

a front striking face, a back plate, a toe wall, a heel wall, and a sole plate, configured to form an interior cavity;

a hosel and a bore for receiving a shaft;

at least one substantially closed chamber formed inside the interior cavity by a plurality of wall members and one of the front striking face, back plate, toe wall, heel wall, and sole plate;

a weight member disposed within the chamber; and

a filler material juxtaposed the weight member and the wall members forming the cavity such that the weight member is isolated from at least one of the wall members and is securely held within the chamber.

2. The club head of claim **1**, wherein the chamber is attached to the sole plate, and wherein the chamber includes side walls and a lid to close the chamber and enclose the weight member and the filler material.

3. The club head of claim **2**, wherein the chamber is further attached to at least one of the front striking face, back plate, toe wall, or heel wall.

4. The club head of claim **1**, wherein the weight member is of unitary construction.

5. The club head of claim **1**, wherein the weight member has a horizontal cross-section that is substantially rectangular and a vertical cross-section that is substantially square.

6. The club head of claim **1**, wherein the weight member has an inhomogeneous longitudinal thickness.

7. The club head of claim **1**, wherein the weight member has a mass of between about 55 grams and about 110 grams.

8. The club head of claim **1**, wherein the club head has a first mass and the weight member has a second mass that is between about 25% and 50% of the first mass.

9. The club head of claim **1**, wherein the weight member is symmetrically disposed within the chamber.

10. The club head of claim **1**, wherein the weight member is isolated from all of the wall members by a plurality of supports.

11. The club head of claim **1**, wherein the weight member comprises tungsten, copper, molybdenum, lead, alloys thereof, and mixtures thereof.

12. The club head of claim **1**, wherein the weight member comprises a plurality of weight member parts.

13. The club head of claim **12**, wherein the weight member parts each have different densities.

14. The club head of claim **1**, wherein the sole plate has at least one aperture for receiving a plug.

15. The club head of claim **14**, wherein the aperture is threaded.

16. The club head of claim **1**, wherein the chamber has a first volume and the weight member has a second volume that is greater than about 50% of the first volume.

17. The club head of claim **16**, wherein the second volume is greater than about 80% of the first volume.

18. The club head of claim **1**, wherein the filler material is selected from the group consisting of adhesive, glue, caulking material, thermosetting or thermoplastic resins, epoxy, and mixtures thereof.

19. The club head of claim **18**, wherein the filler material is epoxy.

20. A metal-wood club head, wherein the head comprises:

a front striking face, a back plate, a toe wall, a heel wall, a sole plate, a crown, and an arcuate skirt, configured to form an interior cavity;

a hosel and a bore for receiving a shaft;

at least one chamber formed inside the interior cavity by a plurality of wall members and one of the front striking face, back plate, toe wall, heel wall, sole plate, crown, and arcuate skirt;

a weight member disposed within the chamber; and

a filler material juxtaposed the weight member and the wall members forming the cavity such that the weight member is isolated from at least one of the wall members and is securely held within the chamber.

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